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complete series of graphic reconstructions would seem to justify the great amount of labor which it requires, and, at the reviewer's suggestion, Mr. R. E. Scammon is preparing such a series for the "Normentafel" of *Squalus acanthias*. In the Harvard Laboratory some progress has been made toward such a series for the pig. This plan has been partly carried out in the "Normentafel" for man, thus adding materially to its value. The text figures accompany the brief descriptions of the various embryos, which precede the tables.

In addition to the descriptions, tables, plates and bibliography, there are three general discussions of great interest. The first (pp. 7-14) is a critical account of the youngest known human embryos. There has been something hardly scientific in the attempt to obtain the "youngest yet known"—in the description of specimens "excessivement jeune," and in monographs on fragments and pathological debris. Keibel's review shows that the two pages written by von Spee, included in Peters's monograph of 143 pages dealing with a single specimen, is at present the most illuminating account of the youngest human embryo. A reconstruction of this specimen, made by Keibel, is described briefly. From the study of Peters's, von Spee's and Keibel's youngest specimens it is inferred that the cavities of the human amnion, yolk-sac and extra-embryonic coelom arise as clefts in solid masses of cells; their development is illustrated in a series of diagrams. An amniotic duct, such as is indicated in Eternod's familiar model, is not found in the younger specimens, and in these there is no neurenteric canal.

The second general chapter (pp. 80-89) includes a comparison of human embryos with those of apes and *Tarsius*. It is found that the youngest stages of man and the apes are very similar, but that they differ materially from *Tarsius* at a corresponding stage. Although the human embryo is very much like that of an orang, "a glance is sufficient to distinguish it from any other well-known form." In this chapter it is stated that the bend in the back of human embryos, such as is seen in the reproductions of the His models

found in most laboratories, is abnormal.

The third section (pp. 152-162) is a comparative embryological study of various structures, based upon the preceding numbers of the "Normentafeln." Thus it is stated that the allantois in man and the apes develops very early, before segments have formed. In *Tarsius* also it arises before there are any segments, but later than in man and the apes. It first appears in pigs of four to five pairs of segments, in rabbits of about eleven pairs and in chicks of more than twenty pairs. Similar comparisons are made for the lungs, pancreas, thyroid gland, etc. A foundation is thus laid for future work in comparative embryology which shall be more accurate and detailed than anything yet realized.

It may be noted that in two human specimens, a fifth pair of pharyngeal pouches was identified, in one case reaching the ectoderm. Fox's recent studies of the pig, cat and rabbit have failed to show a fifth pouch, but Tandler declares that its presence in man is not a morphological speculation—it is an established fact. This question is clearly one which requires further study. In fact the great value of this "Normentafel" is the stimulus and aid which it affords to further research. The need of early human embryos is emphasized. The omission of any account of the muscular and lymphatic systems is conspicuous. But the great progress which has been recently made in human embryology has been compactly recorded. The work is of the utmost practical value, and in a recent discriminating review it has been described as a "masterpiece of scientific effort." It is the only comprehensive account of strictly human embryology which is now available.

FREDERIC T. LEWIS

#### SPECIAL ARTICLES

##### NOTICE OF TWO NEW HORIZONS FOR MARINE FOSSILS IN WESTERN PENNSYLVANIA

SINCE the time of the second geological survey of Pennsylvania it has been generally accepted that there are three horizons at which marine fossils may be found in the Conemaugh series of western Pennsylvania. The oldest of these is the Brush Creek limestone, about

100 to 125 feet above the Upper Freeport coal. From 60 to 90 feet above this is the Pine Creek limestone, while the Ames limestone is about 125 feet above the Pine Creek and 300 feet below the Pittsburg coal. Under various names these limestones have been reported from a large area in western Pennsylvania, northern West Virginia and southeastern Ohio. As these limestones are all very thin and are included in a great mass of shales and sandstones of debatable origin, the discovery of two more layers containing marine fossils is of some interest.

The first of the layers is about 50 feet below the base of the Ames limestone on Brighton Road, just west of Wood's Run, Allegheny, Pa. This stratum was noted by the writer in 1907, but as it was found in only one place, it was thought at the time that it might be a disturbed block of the Ames limestone. It was, however, mentioned in a paper just published in the *Annals of the Carnegie Museum*, Volume V., page 174, and its correct stratigraphic position indicated in the diagram on Plate XII. As exposed at the type-locality on Brighton Road, the fossiliferous layer is about three inches thick and contains numerous crinoid stems, *Producti*, and cup-corals. It is a hard clayey limestone, with most of the lime leached out at the outcrop. It outcrops at a number of places within two miles of this locality, but has not yet been traced to any distance. At some of the other outcrops the layer is thicker, the greatest thickness noted being eighteen inches.

In an article on the Conemaugh formation in southern Ohio just published in the *Ohio Naturalist*, Mr. D. Dale Condit describes a thin marine limestone about half-way between the Ames and the Upper Cambridge limestones. This limestone occupies the same stratigraphic position as the one here described, but as they are separated by a very wide area in which neither has been sought, it is too early to attempt to correlate the two. The credit for the discovery of the second layer with marine fossils belongs largely to the Rev. P. E. Nordgren, of Duquesne, Pa., who found loose blocks of fossiliferous shale along

the railroad tracks about two miles west of Duquesne. The writer was able to trace these blocks to their source in a layer of green sandy shale at the top of the Birmingham shale. This layer is about 65 feet above the Ames limestone. In the vicinity of Pittsburg the Birmingham shale is a conspicuous formation in the cliffs which border the rivers. It is from 40 to 50 feet in thickness and the base is about 25 feet above the top of the Ames. At the base of the Birmingham there is always a layer of very thin-bedded black shale, and sometimes a coal which is supposed to represent the Elk Lick. Above this carbonaceous layer are thin-bedded dark shales which contain pinnules and stems of ferns, and numerous *Estherias* and fish-scales. Higher up the shales become lighter colored, often sandy, and are very barren of fossils. The only fossils so far found in these light-colored layers are a few specimens of an *Aviculopecten* like *A. whitei*, a shell which is often found associated with fossil plants. At the top of the Birmingham there is an abrupt change in the color, the upper 8 to 15 feet being a red fissile shale. Just beneath the red shale, or sometimes a few feet above the base of the shale, there is a rather prominent layer of sandy shale which has now been found to contain marine fossils. The fossils are species of *Productus*, *Allorisma* and other pelecypods, and *Tainoceras occidentale*. Fossils have been found in this layer in Riverview Park, Allegheny, below Kennywood Park near Duquesne, at Glassport, at Wilmerding and at East Pittsburg. It is most fossiliferous at the locality discovered by Mr. Nordgren below Kennywood Park, and that should be considered as the type-locality.

In Riverview Park *Aviculopecten* may be found in a layer 25 feet above the layer just described and a further search for fossils may show that the Ames is far from being the last marine deposit in western Pennsylvania.

PERCY E. RAYMOND

CARNEGIE MUSEUM,  
May 7, 1909

#### NEW FACTS ABOUT BACTERIA OF CALIFORNIA SOILS

THE bacteriological study of California soils at this Experiment Station during the past year